work to which I can direct your attention as giving the fauna of a particular district, with the geographical range of such of the species as are likewise found elsewhere. R. M'Lachlan, who in 1865 had published (Trans. Ent. Soc. ser. 3, v.) a Monograph of the British Caddis-flies, gave in 1868 (Trans. Ent. Soc. for 1868) a Monograph of the British Neuroptera Planipenna, but little is there said of the European range of our species. In 1867 (Entom. Monthly Mag. iii.) Mr. M'Lachlan, who is one of our most philosophical writers, gave a Monograph of the British Psocidæ, and he there says with reference even to their distribution in our own country, 'As a rule, I have not mentioned special localities; these insects have been so little collected that an enumeration here of known or recorded localities would probably appear ridiculous in a few years.' The Rev. T. A. Marshall has given (Entom. Monthly Mag. i. to iii.) an essay towards a knowledge of the British Homoptera, in which occasionally allusion is made to the European distribution of our British species.

"The position of the Insect-fauna of Britain may be thus stated: the late J. F. Stephens commenced in 1827 a systematic descriptive work of all the orders of British Insects as 'Illustrations of British Entomology;' it ceased to appear after 1835, until a supplementary volume came out in 1846. The Lepidoptera, Coleoptera, Orthoptera, Neuroptera were wholly, the Hymenoptera partly, done, the Hemiptera and Diptera altogether left out. In 1839 Mr. Stephens published, in a more compendious form, a 'Manual of British Beetles.' In 1849 an attempt was made to supply the gaps in the British Entomology left by Stephens, and a scheme of a series of volumes called 'Insecta Britannica' was elaborated, in which Mr. F. Walker was to undertake the Diptera, Mr. W. S. Dallas the Hemiptera, and great progress having been made in our knowledge of the smaller moths since 1835, I undertook to write a volume on the Tineina. This scheme was so far carried out, that three volumes on the British Diptera by Mr. F. Walker (assisted by the late A. H. Haliday) appeared in 1851, 1852, and 1856, and my volume on the British Tineina in 1854. In 1859 another great group of the smaller moths was described by S. J. Wilkinson in a volume entitled 'The British Tortrices.' The British Hemiptera, not having been done by Mr. Dallas, were undertaken by Messrs. Douglas and Scott for the Ray Society; and in 1865 a 4to volume was issued, containing the Hemiptera, Heteroptera, leaving the Homoptera for a second volume, still in progress. Even in this elaborate work little or nothing is said of the geographical distribution out of Britain of our British species. The same will apply to the late J. F. Dawson's 'Geodephaga Britannica," published in 1854; to Westwood's "Butterflies of Great Britain,' published in 1855; and to E. Newman's 'Illustrated Natural History of British Moths,' published in 1869.

"I believe I do not at all exaggerate if I say that for many years Entomology was pursued in this country with an insularity and a narrow-mindedness of which a botanist can scarcely form a conception. The system of only collecting British Insects was pursued to such an extent, that it was almost a crime to have a non-British insect in one's possession; if accidentally placed in one's cabinet it might depreciate the value of the entire collection, for Mr. Samuel Stevens can assure you that the value of the specimens depends very much upon their being indubitably and unmistakeably British. A specimen caught in Kent which would fetch 2*l.* would not be worth 2*s.* if caught in Normandy. I satirised this practice several years since in the 'Entomologists' Weekly Intelligence' (vol. v. and 1858, articles 'Jeddo' and 'Insularity'), but it is yet far from extinct"

Perfectly concurring in Mr. Stainton's observations in the last paragraph, I would however add that there are purposes for which a local or geological collection distinct from the general one may be of great use, and such a collection would be much impaired by the introduction of stray foreign specimens. In a local museum, a separate room devoted exclusively to the productions of the locality is very instructive with reference to the history of that locality, and I have seen several such spoiled by the admission of exotic specimens, giving the visitor false impressions, which it takes time to remove. But it is never from such an exclusive collection that the fauna or flora of the district can be satisfactorily worked out, or that any branch of Zoology or Botany can be successfully taught.

Mr. Stainton adds, "It has been suggested to me that those who have critically studied the distinctions between closely allied species have rarely the time to work out in addition their geographical range, and that those who might work up the latter subject might fail in their good intentions for want of a proper knowledge of species." Upon this I would observe that, in the due appreciation of a species of its limits and connections, its geographical range and the various forms it assumes in different parts of its area are an essential element; and it appears to me that the neglect of this and other general characters is one reason why many able naturalists, who have devoted their lives to the critical distinction of races of the lowest grades unduly raised to the rank of species, have really contributed so little to any science but that of sorting and naming collections. On the other hand, the study of geographical range without a proper knowledge of species is little more than pure speculation. Division of labour carried too far tends to narrow the mind, and rather to delay than advance the healthy progress of science.

Mr. Stainton informs me that "there has just appeared a monograph of the Ephemeridæ, by the Rev. A. E. Eaton (Trans. Entom. Soc. 1871), treating of those insects throughout the globe; and when any species are noticed which occur in this country, their entire geographical range is noticed. It is altogether a valuable paper, on account of the thoroughness with which it seems to be done."

Since I last noticed our biological publications two valuable and beautifully illustrated but costly Ornithological works, Sclater and Salvin's "Exotic Ornithology," and Sharpe's "Monograph of the Alcedinidæ." have been completed, and various Memoirs by Flower, Mivart, Parker, and others, have considerably advanced our knowledge of the comparative anatomy of various groups of Mammalia. In our own country also, as well as on the Continent, the biology of various distant lands has continued to be worked out in Memoirs or independent publications, which I had contemplated noticing in succession; but time obliges me now to stop, and defer to a future occasion the compilation of the notes I had collected on North American, Australian, and other Monographs, Faunas, and Floras.

SCIENTIFIC SERIALS

THE *Geological Magazine* for June (No. 84) commences with some notes on Crinoids by Mr. John Rofe, relating rather to the zoological than to the geological aspects of that class of animals. Mr. Rofe describes some experiments made on recent Crinoids by treating them with solution of potash or muriatic acid, from which he arrives at the conclusion that their hard parts are invested by a membrane giving them a certain degree of flexibility, a general position which few naturalists will be inclined to dispute. But the details of structure described by Mr. Rofe will be found of much interest. In his concluding remarks he endeavours to show an approximation between the Crinoids and the Tunicata, which, to say the least of it, is very doubtful.—Mr. S. Allport publishes a note on the microscopic structure and composition of a rock from the "Wolf Rock" off the Land's End, which he identifies with phonolite, and justly protests against the system which gives different names to rocks identical in mineral composition because they happen to be of different geological ages.—Mr. D. Mackintosh describes the drifts of the west and south borders of the Lake district, with especial reference to their great granitic dispersions which he believes have taken place; and Messrs. C. and A. Bell discuss the divisions of the English Crags as indicated by their invertebrate fauna. They propose as the result of their investigations, to divide the Crag into Upper, Middle, and Lower; the Upper including the Norwich, and the upper part of the so-called Red Crag; the Middle, the remainder of the Red Crag; and the Lower, the Coralline Crag. The last paper consists of a comparison of the metamorphic rocks of Scotland and Galway, by Mr. G. H. Kinahan. The first and last of these papers are illustrated with plates.

The second part of Tome xliii. of the *Bulletin de la Société Impériales des Naturalistes de Moscou.* completing the first half volume for 1870, is the last portion of this publication that has yet reached this country. It contains the continuation of M. Ferd. von Herder's notice of the monopetalous plants collected by G. Radde and others (*Plantæ Raddeanæ Monopetalæ*) in Eastern Siberia, the Amurland, Kamtschatka, and Russian America, and includes references to numerous species of Compositæ.—M. N. Erschoff communicates a note upon the Lepidoptera of Western Siberia, containing a list of species from the town of Omsk. — A Russian paper on the Oligochætal Annelid,

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Pelorydes inquilina, by M. H. Zingera, will probably attract few English readers.—M. E. Regel publishes a portion of a second supplement to the enumeration of the plants collected by Sewerzow in 1857 in Central Asia. It includes the Ranunculaceæ, Berberideæ, Nymphæaceæ, Papaveraceæ, Fumariaceæ, and Cruciferæ. Several new species are described.—Another botanical paper is an abridged French translation of part of the Introduction to a Flora of Moscow, by M. N. Kauffmann, the translation being made by Mr. G. O. Clerc. The Flora, which is a Catalogue of the vascular plants of the Government of Moscow, will appear in future numbers.—We find in this number two entomological papers, both on Coleoptera, and one of them of great importance, namely, a Monograph of the Graphipteridæ by the Baron Chaudoir. The other paper is a continuation, by M. Victor Motschoulsky, of his apparently interminable enumeration of the new species of Coleoptera collected by him in his journeys. It includes descriptions of species of Melasomata, and is illustrated with two plates.—M. G. Schweizer describes an easy method of approximately finding the meridian line; and M. A. Trautschold gives a short notice of some cretaceous fossils from Ssaratof and Ssimbirsk.

Palæontographica.—Beiträge zur Naturgeschichte der Vorwelt. Herausgegeben von Dr. W. Dunker und Dr. K. A. Zittel. Band xx. Lief 1., 1871. In this part of the well-known and most valuable "Palæontographica," Prof. Geinitz commences a monograph of the fossils of the Lower Quader and Lower Pläner beds in the Saxon Elbe valley, which he regards as forming the lowest part of a great Quader-formation, including the Senonian, Turonian, and Cenomanian stages of the French geologists. His Lower Quader is equivalent to the Upper Greensand of English geologists. It is well known that sponges are among the most abundant and striking fossils of our Upper Greensand, and the corresponding beds in the valley of the Elbe seem to be equally rich in remains of this lowest class of animals. With the exception of a summary of the geology of the district, the whole of the present part of Prof. Geinitz's work is occupied by descriptions of sponges, the species of which are beautifully figured in the accompanying plates. Laying the reproaches of Oscar Schmidt to heart, Prof. Geinitz endeavours to arrange his fossil forms in accordance with the system of that author, although, as he justly remarks, it is impossible in the study of fossil sponges to have recourse to those minute characters derived from the spiculæ, which form the basis of recent attempts to classify the recent forms. He notices in all twenty-eight species, of which six appear to be new.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, June 15, "On a Law in Chemical Dynamics." By John Hall Gladstone, F.R.S., and Alfred Tribe.

It is well known that one metal has the power of decomposing the salts of certain other metals, and that the chemical change will proceed until the more powerful metal has entirely taken the place of the other. The authors have investigated what takes place during the process.

The experiments were generally performed as follows:—72 cubic centimetres of an aqueous solution of the salt of known strength, and at 12° Centigrade, were placed in a tall glass; a perfectly clean plate of metal of 3,230 square millimetres was weighed and placed vertically in this solution without reaching either to the top or bottom; the action was allowed to proceed quietly for ten minutes, when the plate was removed, and the deposited metal was washed off. The loss of weight gave the amount of metal dissolved, and represented the chemical action.

The most complete series of results was with copper and nitrate of silver.

In the earlier terms of this series, *twice the percentage of silver-salt gives three times the chemical action*. The close agreement of the observed numbers with those calculated on this supposition continues as far as the 9th term. The law then breaks down, and after about 7 per cent. the increased action is almost in direct ratio with the increased strength.

The position of the plate in the solution was found to make no difference to this 2–3 law.

Similar series of experiments were made with zinc and chloride of copper, zinc and sulphate of copper, zinc and nitrate of lead, iron and sulphate of copper, and other combinations; and in every instance where the solution was weak and the action simple, the law of three times the chemical change for twice the strength was found to hold good.

It was proved that the breaking down ot the law at about 3·5 per cent. of salt in solution was irrespective of the quantity of the liquid, or of the time for which the plate was exposed. With 72 cub. centims. of a 1·41 per cent. solution of nitrate of silver, the rate of action remained sensibly the same for as long as twenty-five minutes, notwithstanding the constant deposition of silver. This apparently paradoxical result is due to fresh relays of the original solution being brought up to the plate by the currents produced, and that period of time elapsing before any of the products of decomposition are brought back again in their circuit.

When it was perceived that within easily ascertainable limits the chemical action is the same for similar consecutive periods of time, experiments were made in far weaker solutions. It was only necessary to lengthen the time of exposure. It was thus found that the law of three times the chemical action for twice the strength of solution holds good through at least eleven terms of the powers of 2; in fact, from a solution that could dissolve one gramme of copper during the hour, to a solution that dissolved only 0·000001 gramme, a million times less.

The manner in which the silver is deposited on a copper plate was examined, and the currents produced were studied. At first a light blue current is perceived flowing upwards from the surface of the plate, presently a deep blue current pours downwards, and these two currents in opposite directions continue to form simultaneously. A similar phenomenon was observed in every case where a metallic salt attacked a plate of another metal. The downward current was found to be a solution of almost pure nitrate of copper, containing about three times as much NO_3 as the original silver solution, while the upward current was a diluted solution of the mixed nitrates. Moreover, the heavy current took its rise in the entangled mass of crystals right against the plate, while the light current flowed from the tops of the crystalline branches. It was evident that when the fresh silver was deposited on these branches, and the fresh copper taken up from the plate, there was not merely a transference of the nitric element from one combination to another, but an actual molecular movement of it towards the copper plate, producing an accumulation of nitrate of copper there, and a corresponding loss of salt in the liquid that is drawn within the influence of the branching crystals. Hence the opposite currents.

The amount of action in a circuit of two metals and a saline solution must have as one of its regulating conditions the conducting-power of that solution. It appeared by experiment that a strong solution of nitrate of silver offers less resistance than a weak one; and it was also found, on adding nitrate of potassium to the nitrate of silver, that its power of attacking the copper plate was increased; that the augmentation of the foreign salt increased the action still further; and that the 2-3 law holds good between two solutions in which both the silver and potassium salt are doubled, though it does not hold good if the quantity of foreign salt be kept constant. Similar results were obtained with mixed nitrates of silver and copper.

While these later experiments offer an explanation of the fact that a solution of double the strength produces more than double the chemical action, they do not explain why it should produce exactly three times the effect, or why the ratio should be the same in all substitutions of this nature hitherto applied. The simplicity and wide range of the 2-3 law seems to indicate that it is a very primary one in chemical dynamics.

"On Cyclides and Sphero-Quartics." By John Casey, LL.D.

Royal Institution of Great Britain, July 3.—Sir Henry Holland, Bart., M.D., F.R.S., president, in the chair. William Amhurst Tyssen Amhurst and Lawrence Trent Cave were elected members.

Royal Geographical Society, June 26.—Major-General Sir Henry C. Rawlinson, K.C.B., president, in the chair. The following new fellows were elected: Thomas Brassey, M.P.; T. B. Baker, C.B.; D. Chinery (Consul-General for Liberia); Commander C. D. Inglis, R.N.; William Charles Jackson; G. W. Kennion; Alfred Morrison, William G. Margetts, Colonel R. Maclagen, R.E.; Captain G. S. Nares, R.N.; and James Rickards. A letter was read from Sir Roderick Murchison, giving Dr. Kirk's views of Dr. Livingstone's position, as communicated in a recent letter from Zanzibar, dated the 30th April last. It appeared that

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